USAMRIID

I. HISTORY OF BIOLOGICAL WARFARE

A. SIGNIFICANT EVENTS: A HISTORICAL PERSPECTIVE

The following events, some proved and some alleged, comprise a short history of biological warfare.

1346 The use of bacteriological agents in an armed conflict can be dated back to 1346, at Kaffa (now Feodossia) where the bodies of Tartar soldiers who succumbed to the plague were thrown over the walls of the besieged city. It is hypothesized by some medical historians that the action resulted in the infamous pandemic that spread over the entire continent of Europe from Genoa, via the Mediterranean ports.

1710 During the war between Russia and Sweden, Russian troops are said to have used the cadavers of plague victims to provoke an epidemic with the enemy.

1767 The French and Indian War was fought in North America between France and England during the period of 1754-1767. Both sides relied heavily on the support of Indian allies. The English attacked Ft. Carillon twice and were repulsed with heavy losses. An English general, Sir Jeffery Amherst, surreptitiously provided the Indians loyal to the French with blankets infected with smallpox virus. The resulting epidemic decimated the Indians. Shortly thereafter, General Amherst successfully attacked Ft. Carlillon and renamed it Ft. Ticonderoga. By deduction, the small pox epidemic played a significant role in the victory.

1917 In World War I, there is evidence that German agents inoculated horses and cattle with glanders disease in the United States before they were shipped to France. Although horsepower was a major component of logistics during World War I, the German use of BW obviously was not successful in altering the course of the war.

1930-1940 The years between World War I and World War II were quiet ones. Several studies were prepared on BW and military planners were divided on its usefulness. Major Leon Fox, U.S. Army Medical Corps, published a lengthy and defining report for the period which concluded that BW would not be effective because of modern sanitary procedures.

1937-1945 Japan Program

Japan started an ambitious BW program in 1937, 40 miles south of Harbin, Manchuria in a laboratory complex code named "Unit 731." These studies continued until 1945 when General Ishii ordered the labs of Unit 731 burned to the ground. At the end of World War II, the United States granted amnesty to those Japanese scientists who had participated in the research. Amnesty was granted on one condition. These scientists had to disclose all information accumulated during their programs to the U.S. government. This situation probably developed from the post-war experience in Europe in which the U.S. and USSR competed for German rocket experts.

Two Camp Detrick scientists, Dr. Edwin Hill and Dr. Joseph Victor, went to Japan in 1945 and interviewed 22 BW scientists. They brought back several large cases of information. This information was not particularly useful to the U.S. program because the data could not be quantitated.

The list of organisms that received research effort during this program was not unlike present day shopping lists of potential BW agents; i.e., anthrax, tularemia, plague, botulism, small pox, glanders, typhoid, typhus, etc. Dr. Hill reported that based on his review, slightly less than l,OOO human autopsies had been performed at Unit 731, and that most of these were performed on humans exposed to aerosols of anthrax. In 1945, this BW program had stockpiled 400 kg of anthrax to be used in a specially designed fragmentation bomb.

In 1940 in China and in Manchuria an epidemic of bubonic plague followed overflights by Japanese aircraft. Infected fleas were dropped together with grain which attracted the local rat population; in turn, the rats served as carriers for the infected fleas to the human population.

1943-1969 U.S. Offensive Program (See Section II)

1975-1983 Yellow Rain

> Documented testimony indicated that the countries of Laos and Kampuchea were attacked by planes and helicopters delivering aerosols of several colors (yellow, green and white). Shortly after delivery, people and animals became disoriented, sick and a low percentage of those strickened, died. Somewhat later, similar clouds of aerosols were observed in Afghanistan. All these attacks have been lumped under the general category "YELLOW RAIN." The trichothecene toxins (and most prominently, T-2 mycotoxin) are thought to comprise at least some of these clouds. Several prominent scientists believe that the United States did not prove the case of yellow rain being used in southeast Asia. One scientist in particular developed an hypothesis that defined these chemical attacks as being caused by swarms of defecating bees. Since impinger samplers were not present at the time of aerosol release, it was impossible to collect the necessary evidence that could establish a BW attack. Notwithstanding, the overwhelming data suggest the employment of toxins derived from biologically-grown microorganisms.

1978 A Bulgarian exile Georgi Markov was stabbed with a steel ball (attached on the end of an umbrella) packed with ricin while waiting on a bus in London on 7 September 1978. He died several days later. This incident represented the first case in recent history of state supported terrorism with a B/C agent.

1979 Sverdlovsk Incident

> In late April, 1979, the city of Sverdlovsk experienced a loud explosion that was identified as originating from Military Compound 19. Several days later, residents downwind from this compound developed high fever and difficult breathing. Over the next several days, more cases were reported and fatalities rose sharply to around 40. Autopsies revealed severe pulmonary edema in addition to symptoms of serious toxemia. Local doctors announced an outbreak of pulmonary anthrax. On the other hand, government officials reported that the outbreak was caused by the illegal sale of contaminated meat from a cow suffering from the disease. Case fatalities did not display the symptoms of the usual gastric or skin anthrax, which would be more likely if contaminated beef had been handled or eaten.
>
> A nine story hospital was taken over by the military to handle exclusively the victims of the explosion. Vaccination and antibiotics were provided to patients and residents alike. The final death toll was estimated between 200 to 1,000. The victims were buried with special sanitary precautions, and relatives were not allowed to attend the funerals.
>
> Some western scientists, including those that doubted the evidence in Southeast Asia, accepted the explanation provided by the Soviet Ministry of Health. The Sverdlovsk incident remained unproven; yet all evidence available to the U.S. Government indicated that a massive accident had occurred at a BW production facility. Believers and non-believers of the Soviet explanation remained in a status quo situation until President Boris Yeltsin acknowledged in a press conference, prior to meeting with President Bush in the summer of 1992, Washington, D.C., that the Sverdlovsk incident was in fact a massive BW accident involving an aerosol of anthrax spores.

1991-1992 Presumptive evidence acquired by United Nations BW Inspection Team indicates that Iraq could have been in the early stages of developing an offensive BW capability. On-site inspections revealed several laboratories with state-of-the-art equipment that could have been used for agent production. No evidence, to date, has been established for munitions development and/or agent weaponization. The experience of the U.N. team emphasizes the difficulty of locating a "Smoking Gun" relative to BW programs. This type of program is much easier to hide from inspection than either chemical or nuclear programs.

B. SIGNIFICANT EVENTS IN THE HISTORY OF THE U. S . OFFENSIVE PROGRAM

The United States initiated a review of the potential of BW in 1941-1942, implemented a program in 1943 and had established its feasibility by 1969. In 1969, President Nixon disestablished offensive studies including the destruction of all stock piles of agents and munitions. As important events of this program are to be described, the political climate in which the program was implemented must be considered. The policy of the United States was first and foremost to deter its use against U.S. forces, and secondarily to retaliate if deterrence failed. When the BW program was established, the United States was fighting World War II on two fronts, Europe and Asia. When World War II ended, a cold war developed in which

the security of the country was still threatened. The tempo of world attitudes and times have changed significantly in the 23 years following the elimination of U.S. BW programs. Because a potential BW threat still exists, the U.S. maintains a defensive BW program.

1941 Secretary of War Henry L. Stimson requested National Academy of Sciences (NAS) to appoint a committee to survey the feasibility of BW. Scattered intelligence reports indicated that Germany and Japan might be preparing for BW.

1942 NAS committee concluded that BW might be feasible and recommended that steps be taken to reduce U.S. vulnerability to BW attack. A civilian agency, the War Reserve Service (WRS) was formed under the direction of George W. Merk, of the Merk Company, a pharmaceutical firm. The WRS soon concluded that pertinent information could not be gotten without large scale developmental operations. The Chemical Warfare Service (later designated Army Chemical Corps) was asked to assume responsibility for large scale activities including the construction and operation of laboratories and pilot plants. The Army chose Camp Detrick, Frederick, Maryland, a small National Guard airfield, as the site for research and development.

1943 Camp Detrick becomes operational as the parent research and pilot plant center with about 4000 personnel: 2800 were Army, about 1000 Navy and the remaining 100 civilian. Field testing facilities were established in Mississippi.

1944 Dugway Proving Grounds in Utah was established as the test center and replaced the facility in Mississippi. Production plant was constructed in Terre Haute, Indiana which never became operational with pathogens. The plant lacked sufficient engineering safety controls during the fermentation and processing of the simulant, Bacillus globigii (BG). High levels of BG spores were found throughout the plant during operations.

1945-1949 At the end of World War II, construction activities and the testing programs were terminated. All activities gradually phased down to a research status. The production plant in Indiana was sold to Charles A. Pfizer for commercial use.

In 1946, the War Department released to the nation and world that the United States had worked on BW. The release stated, in part:

> "In all work on biological warfare carried on in the United States, extreme care was taken to protect the participating personnel from infection. Many new techniques were devised to prevent infection and proved highly successful. Hospitals and dispensaries were maintained at all installations, staffed with both Army and Navy personnel and were equipped to treat accidental infections. As the result of the extraordinary precautions taken, there occurred only sixty cases of proven infection caused by accidental exposure to virulent biological warfare agents which required treatment. Fifty-two of these recovered completely; of the eight cases remaining, all are recovering satisfactorily. There were, in addition to the sixty proven cases, 159 accidental exposures to agents of unknown concentrations. All but one of these received prompt treatment and did not develop any infection. In one instance, the individual did not report exposure, developed the disease, but recovered after treatment."

Mr. Merck in his final report to the Secretary of War noted that although remarkable achievements had been made, the potential of BW had by no means been completely measured. He recommended that the program be continued on a sufficient scale to provide an adequate defense.

In the 1947-1949 period small scale outdoor testing was conducted at Camp Detrick using two biological simulants, Bacillus globigii (BG), a spore forming microorganism, and Serratia marscens (SM), a vegetative organism. Both simulants were considered to be totally harmless by medical and scientific experts.

In 1949, an enclosed one million liter test sphere was built of steel at Camp Detrick and BW explosive munitions tests with pathogens were started.

1950 The BW program was expanded during the Korean War years and spurred efforts to again develop a BW retaliatory capability based on the threat of USSR involvement. Expansion plans were kept highly secret.

1951 The first limited BW retaliatory capability was achieved when an anticrop bomb was developed, tested and placed in production for the Air Force. Anticrop agent production sites were carefully selected for safety with the coordination and approval of the U.S. Department of Agriculture.

Construction of a BW bacterial production facility was started at Pine Bluff Arsenal (PBA), Arkansas.

1953 Major research facilities were constructed to support the expanded R&D program at Camp Detrick. These new laboratories were built to much higher standards of safety than the temporary building constructed during World War II.

With the expansion of the BW retaliatory program, there was a significant increase in defensive studies; i.e., the research program against BW was almost doubled. Data were obtained on personnel protection, decontamination and immunization. Early detection research and alarm systems were initiated but progress was slow then and remains slow today because of the complexity of the technical problems.

1954 PBA production facility becomes operations to meet estimated requirements.

Production of hardware for antipersonnel BW agent cluster bombs delivered to PBA for filling with Brucella suis to support Air Force requirements.

1955 Large scale production of Francisella tularemia was established at PBA.

1956 Marshal Zhukov announces to the Soviet Congress that BW and CW weapons would be used by their armed forces for mass destruction in future wars. U.S. BW/CW policy was reviewed and effort to increase our military effectiveness was implemented.

Camp Detrick became Fort Detrick on 3 February 1956.

The decision to use BW or CW was reserved for the President.

1959 The Chemical Corps mission reached a height of emphasis unprecedented since World War II. The Military Services were submitting requirements for BW munitions, which included dissemination means for artillery, missiles, drones and other lesser weapon systems.

1960 Congress becomes interested in CBR disarmament and holds extensive hearings on the subject. Stimulated by this initiative, the Department of Defense conducted detailed studies concluding that through 1970 no single inspection procedure or combination of procedures were available that would offer a high level of assurance against militarily significant violations of BW arms limitations. Moreover, there was no inspection procedure that would insure against clandestine use of these weapons.

1961 The Kennedy Administration called for a thorough reassessment of BW by the Joint Chiefs of Staff (JCS), considering all possible applications including its use as an alternative to nuclear weapons. This project number, Number 112, was one of about 150 projects the new defense leaders were emphasizing. The recommendations of Project 112 would serve as a basis for R&D expansion through 1967.

1962 Desert Test Center (DTC) was established at Ft. Douglas, Salt Lake city, Utah and had as its mission the testing of biological weapons and defense systems at extra-continental test sites. DTC, while reporting to the Army Chief Chemical Officer, had to obtain approval by the JCS for conduct of tests which included materiel, personnel and funds.

1964-1966 Virus and Rickettsiae Production plant build at PBA. Plant processes were based on the inoculation, harvesting and processing of infected embryonated chicken eggs.

Large-scale freeze drying and spray drying systems built and became operational at PBA.

Entomology capability acquired at PBA in 1965. Plant was never operated in a "hot" mode.

By end of 1966, production facilities were all now fully operational and the BW plants produced several agents. Various types of munition hardware were delivered to PBA, filled and stored there. These munitions were never shipped anywhere except for test purposes.

In June, 1966, vulnerability of U.S. cities to covert BW attack was demonstrated in New York City subway system. This test has received considerable publicity in the news media. The harmless simulant BG was disseminated within the subway tubes and from the street into the subway stations. The simulant data, when translated into equivalent covert attacks with pathogenic agents during peak traffic periods indicated that large numbers of people could be exposed to infectious doses.

1967 With the need for increasing money to support the U.S. Army's increased involvement in the Vietnam War as well as the mounting efforts in the United Nations to achieve some sort of disarmament agreement in BW/CW, the BW program experienced its first cut in monies. The program continued to experience program cuts in 1968 and 1969. During the latter

half of 1968 and throughout 1969, various peace organizations sent their people to picket Ft. Detrick. A long line of pickets, 50 to 100 people, in single file would stand at the front gate of Ft. Detrick each morning (7:30 -10:00 am) to greet R&D personnel coming to work.

1959-1969 The Golden Years

The last 10 years of the offensive research and development were "golden" in that a substantial number of scientific advances were made. These advances provided a base of technical information on which it was concluded that biological warfare was eminently feasible with one caveat: the employment of BW was dependent upon careful preplanning. A few of the scientific advances that made this possible are defined in generic terms.

Large scale fermentation of pathogenic microorganisms was achieved and could be done safely.

Large scale technology was developed for purifying and concentrating bacteria, viruses, rickettsiae and their metabolic by products (toxins).

Technology was developed for stabilizing both liquid and dry agents. Stabilization included preservation of the agent at logistical temperatures as well as protecting the agent during aerosol dissemination and cloud aging, and over a wide range of environmental conditions.

A variety of munitions were developed that were capable of disseminating agents (liquid and dry products) at high levels of efficiency and in the optimum particle size.

The modern principles of biosafety and containment were established by Ft. Detrick scientists, and one in particular is noteworthy, Arnold G. Wedum, M.D., Ph.D.

1969 President Nixon visited Ft. Detrick on 25 November 1969 and announced a new national policy on BW:

> "The U.S. shall renounce the use of lethal biological agents and weapons, and all other methods of biological research to defensive measures such as immunization and safety measures."

Since President Nixon did not specify "toxins" in his announcement, the scientists at Ft. Detrick, not wanting to loose their jobs and believing that a loophole had been provided to continue BW studies, rewrote their research plans, changing the direction of their research from agents to toxins. This plan of action, so logical and satisfying to the psyche at the time, did not work as noted below.

1970 President Nixon further defined U.S. National Policy on BW in a statement dated 14 February 1970:

> "The United States will confine its military programs for toxins, whether produced by bacteriological or any other biological method or by chemical synthesis, to research for defensive purposes only, such as to improve techniques of immunization and medical therapy."

1970-1972 Total destruction of antipersonnel BW agent stocks and munitions were accomplished between 10 May 1971 and 1 May 1972. The BW plant facilities at PBA were decontaminated and turned over to the Food and Drug Administration.

The offensive research program was also terminated in 1970 with a complete inventory of all BW material at Ft. Detrick and Dugway Proving Ground, and destruction of all items except those essential to defensive BW research.

Several R&D facilities at Ft. Detrick were decontaminated and leased to the National Cancer Institute and the Army's Health Services command. The formal transfer was completed in 1977.

The BW defense program (other than medical defensive studies) was transferred to Edgewood Arsenal.

1975 President Ford signed the Biological Weapons Convention on the prohibition of the development, production and stockpiling of bacteriological (biological) and toxin weapons on 22 January 1975.

C. SIGNIFICANT EVENTS: HISTORY OF THE U. S. ARMY MEDICAL RESEARCH INSTITUTE OF INFECTIOUS DISEASES

Early Years

1950-1954 Several years before any formal arrangements were made, the Surgeon General was concerned about medical defensive problems and a single medical officer from the Walter Reed Army Institute of Research (WRAIR), LTC Abram S. Beneson, was appointed as a medical liaison officer with the Biological Warfare laboratories at Ft. Detrick. Later a Joint agreement was signed and studies on medical defense against biological weapons were conducted cooperatively by the Chemical Corps and the Army Medical Department.

During these early years, a Congressionally approved medical volunteer program designated "Project Whitecoat" was worked-out in 1954 following a series of meetings with representatives of the General Conference of the Seventh-day Adventist Church and the Surgeon General of the Army.

1956 USAMRIID, then known as the Army Medical Unit under the direction of the Army Surgeon General, began formal operations in 1956 under the command of Colonel W. D. Tigertt. One of the Unit's first responsibilities was to serve as principal investigator managing all aspects of Project CD-22, the exposure of volunteers to aerosols containing a highly pathogenic strain of Coxiella burnetii, the etiologic agent of Q fever. These pioneering studies demonstrated that man was susceptible to as few as ten guinea pig doses when delivered as a small particle aerosol (1 to 5 microns). The sick volunteers were closely monitored and antibiotic therapy was administered when appropriate. All volunteers completely recovered from Q fever with no adverse after effects.

1957 Investigational new drug (IND) submitted on behalf of the killed Q fever vaccine.

1961 Colonel Dan Crozier assumed command. He was heavily involved in the planning and construction of the present laboratories Ñwhich rank among the most advanced in the world. During his command, construction of the new laboratory building began with ground breaking in 1967. Personnel moved into Phase I of the building in 1971 and Phase II in 1972.

Killed and live attenuated tularemia vaccines were tested in volunteers using virulent aerosol challenge. This study was particularly significant in that it demonstrated that multiple doses of killed vaccine was not effective in protecting against a small particle aerosol challenge. The live attenuated (LVS) vaccine was highly effective; albeit, the data suggested that protection should be overcome with larger doses of virulent organisms. Since this initial study was accomplished, similar evidence has been established that live, not killed, vaccines are protective against aerosol challenge with different organisms. These latter studies have used primates rather than volunteers.

1965 IND submission for the TC-83 live attenuated Venezuelan equine encephalomyelitis (VEE) vaccine was made.

1967 IND submission for killed Eastern equine encephalitis vaccine was made.

1968 IND submission for killed Western equine encephalitis vaccine was made.

1969 With the disestablishment of the Biological Warfare Laboratories, the Institute underwent a formal name change from the Medical Unit to the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID). Although the Institute's mission did not change, it received additional funding and personnel authorizations to hire biolaboratory scientists who were losing their jobs as a result of the termination of offensive BW studies.

The formal mission tasking USAMRIID reads as follows:

> "Performs studies on the pathogenesis, diagnosis, prophylaxis, treatment, and epidemiology of naturally occurring infectious diseases of military importance with emphasis on problems associated with the medical defense against biological agents and on those microorganisms which require special containment facilities."

By DOD directive and further Army guidance, USAMRIID performs its Biological Agent Medical Defense research in support of the needs of the three services. This mission, and all work done at USAMRIID, is in keeping with the spirit and letter of both President Nixon's 1969 and 1970 Executive Orders renouncing the use of biological and toxin weapons, and the U.N. Convention (Against) Bacteriological (Biological) and Toxin Weapons of 1972.

IND submission of killed Chikungunya vaccine was made.

1972 The Institute received the U.S. Department Superior Service Award. The award reads:

> "For contributing to the achievement of the VEE task force recognized for excellence, creative leadership, dedication and sacrifice in cooperative state/federal service to agriculture and the nation in averting a major animal disease (Venezuelan equine encephalomyelitis) epidemic and agribusiness disaster."

1973 Colonel Joseph Metzger assumed command of USAMRIID, succeeding BG Kenneth Dirks, whose command spanned only a few months. During COL Metzger's command, research priorities were devoted to the development of vaccines and therapeutic modalities against rickettsiae in general, and Coxiella burnetii in particular.

1977 Colonel Richard F. Barquist assumed Command. Under his direction, research programs were implemented or expanded on Argentinean, Korean and Bolivian hemorrhagic fevers, Lassa fever and other unique diseases that could pose potential BW threats as well as affecting rapid deployment forces. These high hazard agents required special BL-4 (P-4) containment facilities in order that they may be studied safely. USAMRIID continues to be one of the few laboratories in the free world where research can be conducted on such virulent organisms with minimum risk to laboratory personnel and no risk to the surrounding environment. The thrust of the research was to develop vaccines and therapeutic measures as well as to develop an understanding the disease progression in appropriate animal models.

1978 The Institute became involved in a severe outbreak of Rift Valley fever (RVF) which occurred for the first time in Egypt. A large supply of the Institute's stock of RVF vaccine was sent to Egypt to help control the epidemic which involved thousands of human cases and the death of large numbers of livestock. USAMRIID investigators also provided a critical diagnostic capability. Priority was then given to the production of 300,000 doses of new vaccine to replenish depleted stocks.

USAMRIID competed against 41 other R&D laboratories throughout the Army and won the coveted award "Best Laboratory" or "Laboratory of the Year" award.

USAMRIID was judged to be the Number One laboratory in the In-house Laboratory Independent Research Program (ILIR) and received a $50,000 bonus to expand its ILIR research. ILIR monies come directly from the Secretary of the Army to the Laboratory Commander (not though regular Army money channels) to fund research which, if successful, will have a major impact on the laboratory mission. ILIR funds are allotted to the participating laboratory on the basis of competition with other R&D Army laboratories.

1979 The Institute acquired fixed and transportable P-4 containment plastic human isolators for the hospital care and safe transport of patients suffering from highly contagious and often lethal infections. A formal agreement was signed with the Centers for Disease Control (CDC), Atlanta, Georgia to house and treat high hazard infections in their personnel, should they occur.

1980 A new program was initiated on Legionella pneumophilia at the urging of some medical authorities. Almost one year later, a panel of experts decided that this organism did not have potential as a BW agent. This dichotomy of expert opinion on what constitutes a BW agent illustrates the problem of developing a medical defensive program. (Editorial comment: Since 1989, there have been an improvement in defining BW threat agents, and medical defensive studies have responded in kind.)

Following the Sverdlovsk accident in 1979, a new program was undertaken to improve the current anthrax vaccine, and to develop new information on the pathogenesis of the disease.

A new research program was initiated to study tricothecene fungal toxins, marine toxins and other small molecular weight toxins of microbial origin. This new program required a reorganization of personnel and a reordering of priorities in order to be implemented.

1982 New diagnostic methods for several organisms were developed using ELISA technology and the production of new diagnostic reagents including the extensive use of monoclonal antibodies.

USAMRIID was selected as winner of the "Laboratory of the Year Award" in competition with all other U.S. Army R&D laboratories.

USAMRIID was selected as the top Army laboratory in the ILIR competition and received a bonus of $100,000 to be applied to future ILIR studies.

A new course entitled, "Medical Defense Against Biological Agents," was introduced. The course was designed to familiarize military physicians, nurses and support personnel with the special problems posed by BW. This course is the one you now attend with some changes in format.

1983 Colonel David L. Huxsoll became Commander and under his leadership the institute was to experience unparalleled growth in resources manpower, money, equipment and facilities.

The mission statement of the institute was changed to read "USAMRIID develops strategies, products, information, procedures and training for medical defense against biological warfare agents and naturally occurring infectious agents of military importance that require special containment."

The Institute's military personnel were organized into 32 biologic/toxin rapid deployment response teams (each team composed of specialist) prepared to support U.S. Forces should situations develop where BW contamination has occurred or is suspected of having occurred.

1985-1990 The Deputy Chief of Staff, Army, (General Maxwell Thurmond) conducted a Functional Area Assessment (FAA) on the biological threat posed to U.S. Forces. The USAMRIID commander played a key role in this briefing. General Thurmond became concerned about the BW threats particularly, the application of genetic engineering technology to alter conventional microorganisms and his FAA review resulted in a five year plan of expansion for medical defensive measures. The 1985 in-house budget of 34 million dollars was to expand to 45 million dollars the next year and was eventually scheduled to reach 93.2 million in-house dollars by 1989, in incremental steps. Twenty-three additional civilian allotments were authorized in 1985 with 275 additional allotments to be added in increments in the succeeding years. The medical contract or extramural programs also received additional resources. Not only did medical defensive measures receive additional funds, but physical defensive funds also significantly increased. The need for a physical detection system to identify an aerosol of infectious agent became apparent. Lack of such a system represented one of the major technical deficiencies that required immediate attention.

The USAMRIID expanded program was designed to continue to address conventional threat organisms, and also to implement several new programs on toxins as well as genetically-altered organisms and carriers. Additional laboratory facilities would be required to support the expanded program: the establishment of a contractor owned-contractor operated (COCO) facility to support major laboratory and administrative requirements was considered; and an MCA project to renovate Building 1412 was placed in readiness.

1986 New toxin program established following the 5 year expansion plan.

l987 The USAMRIID program of expansion set-forth by the FAA in 1985 never materialized. The Army experienced several budget cuts and these were passed-on through channels to the Institute. The toxin laboratory was not built, but Building 1412 was upgraded and additional office space for the professional staff was obtained.

1988-1989 The Investigative Years

The FAA described above provided increased resources to the Biological Warfare Defense Program, not in the amounts originally planned, but the increases were real. The FAA also resulted in an increased awareness by The Congress on how these funds were being spend. No longer was biological warfare defense a quiet area of the DOD budget. Even though by 1988, USAMRIID was actually undergoing cuts in its in-house and extramural programs, USAMRIID came under close scrutiny by several Congressional Committees. For example, the Senate Subcommittee on Oversight of Government Management, chaired by Senator Carl Levin, issued a report quite critical in the DOD's management of biological safety issues in the CBW programs. (Editorial comment: Biological safety is addressed in detail in the "Final Programmatic Environmental Impact Statement," for the Biological Defense Research Program (1989).

Senator John Glenn, Chairman, Committee on Governmental Affairs asked the Government Accounting Office (GAO) to investigate the validity of DOD's Biological Defense Research Program. The GAO issued a critical report that concluded the Army spent funds on R&D efforts that did not address validated BW threats and may have duplicated the research efforts of the Centers for Disease Control and the National Institutes of Health. (Editorial comment: As long as the Biological Warfare Laboratories were active, USAMRIID's role was fairly simple. The Institute developed vaccines and treatment modalities in response to agents that received priority study in the offensive program. This relationship changed in 1969 with the termination of offensive studies. Subsequently, medical defense against BW became a quiet area of attention and low priority. Little or no intelligence resources were assigned to the BW problem since 92 nations had signed the treaty banning BW. USAMRIID filled this void by conducting studies on several classes of organisms, all of which contained members with some level of BW potential.)

1990-1991 Colonel Ronald G. Williams assumed command of the Institute during the period of Desert Shield and Desert Storm. Although BW was not used by Iraq during the Gulf War, USAMRIID provided timely advice and products to insure an effective medical response if a medical defense were required.

USAMRIID scientists trained and equipped six special laboratory teams for rapid identification of potential BW agents.

Vaccines and drugs were deployed in the field to combat infectious diseases that have historically taken the greatest tolls on every battlefield.

Following the war, USAMRIID physicians and engineers were key members of a United Nations Special Commission Inspection Team that evaluated the BW capabilities in Iraq.

1992 Colonel Ernest T. Takafuji assumed command of USAMRIID in September of 1992.